

IV. Remarks:

Reconsideration of this application in light of the above amendments and the following remarks is requested. Claims 1-51 are pending in this application. Claims 2-10, 13-17, 19, 21-27, 30-32, 34, 36-42, 45-47, 49-51 have been amended, claims 1, 18, and 35 have been canceled, claim 52-54 have been added, and claims 11-12, 20, 28-29, 33, 43-44, and 48 have been maintained in their previous form. In view of the foregoing amendments, and the remarks that follow, reconsideration is respectfully requested.

A. Objection to the Specification

The specification has been amended to correct various informalities according to the Examiner's requirement. No new matter has been added.

B. Objections to Claims

Claims 3 and 15 have been amended to correct various informalities, as required by the Examiner. The Applicant appreciates the Examiner's careful work and correction. Claims 16 has been amended as well to correct a similar typographical error.

C. Rejections under 35 U.S.C. § 102

Independent Claim 4

Claim 4 originally depended from Claim 1. The foregoing amendments place Claim 4 in independent form, by adding to Claim 4 the limitations of Claim 1. Also, "located under..." has been amended "located directly under... viewed in a direction from the gate to the substrate" to avoid any ambiguity. These amendments merely convert Claim 4 into independent form and avoid ambiguity, without making any change to the scope of Claim 4.

Claim 4 was rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Publication 2003/0107103 to Iwata et al. (hereinafter "Iwata"). The rejection is respectfully traversed as Claim 4 has been amended to include "a first deep trench structure located directly

under the first portion of the gate viewed in a direction from the gate to the substrate”(emphasis added). In rejection of Claim 1 which is now incorporated into Claim 4, the Examiner asserts (lines 1-2, page 15) that Iwata’s reference teaches “a first deep trench structure [Fig. 4 the far left hand side, 22] located under the first portion [Fig. 1, the line just above 25] of the gate [Fig. 4, 24, 25, 26, 29]”. As clarified by the amended Claim 4, the first deep trench structure is directly under the gate in a top view from the gate to the substrate. However, in Fig. 4 of Iwata’s reference, the trench structure 22 is not directly under the features 24, 25, and 29 in the top view from the gate to the substrate. The trench structure 22 is directly under the feature 26 which is a side-wall spacer instead of the gate itself. Therefore, Iwata does not teach “a first deep trench structure located directly under the first portion of the gate viewed in a direction from the gate to the substrate”. As such, the Iwata reference does not teach every element of amended claim 4, and therefore, cannot support an anticipation rejection of amended claim 4.

Independent Claims 21 and 37

Similarly, Claim 21 and 37 originally depended from Claim 18 and 35, respectively. The foregoing amendments place Claims 21 and 37 in independent forms, by adding to Claims 21 and 37 the limitations of Claims 18 and 35, respectively. Also, “located under...” in Claims 21 and 37 has been amended “located directly under... viewed in a direction from the gate electrode to the substrate” to avoid any ambiguity. These amendments merely convert Claims 21 and 37 into independent forms and avoid ambiguity, without making any change to the scopes of Claims 21 and 37.

Claims 21 and 37 were rejected under 35 U.S.C. § 102(b) as being anticipated by Iwata. The rejections are respectfully traversed as Claims 21 and 37 have been amended to include “a first deep trench structure located directly under the first portion of the gate electrode viewed in a direction from the gate to the substrate”(emphasis added).

In rejection of Claim 18 which is now incorporated into Claim 21, the Examiner asserts (lines 9-11, page 20) that Iwata’s reference teaches “a first deep trench structure [Fig. 4 the far

left hand side, 22] located under the first portion [Fig. 1, the line marked by 25; also see Fig. 4, the far left hand side of the figure] of the gate electrode [25]”. As discussed with respect to Claim 4, the trench structure 22 is not directly under the gate electrode 25 in the top view from the gate to the substrate, in Fig. 4 of the Iwata’s reference. Therefore, Iwata does not teach “a first deep trench structure located directly under the first portion of the gate electrode viewed in a direction from the gate electrode to the substrate” recited in Applicant’s Claim 21.

Claim 37 was rejected by the same ground and with the same assertion (lines 8-10, page 22 of the Office Action). Based on the amendments to Claim 37 and the discussion with respect to Claim 21, Iwata does not teach “a first deep trench structure located directly under the first portion of the gate electrode viewed in a direction from the gate electrode to the substrate” recited in Applicant’s Claim 37.

As such, the Iwata reference does not teach every element of the amended Claims 21 and 37, and therefore, cannot support anticipation rejections of amended Claims 21 and 37.

Independent Claim 50

Claim 50 was rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Publication 2002/0038901 to Kuroi et al. (hereinafter “Kuroi”). Claim 50 was also rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 6,114,741 to Joyner et al. (hereinafter “Joyner”) and U.S. Patent Publication 2003/0107103 to Iwata. The rejections are respectfully traversed as Claim 50 has been amended to include “a substrate including a first well of a first-type dopant and a second well of a second type dopant; a source formed in the first well and drain formed in the second well” and “a first deep trench structure formed partially in the first well and partially in the second well”. None of Kuroi, Joyner, and Iwata teaches “a source formed in the first well and drain formed in the second well” and “a first deep trench structure formed partially in the first well and partially in the second well”. As such, the Kuroi, Joyner, and Iwata references do not teach every element of amended Claim 50, and therefore, cannot support an anticipation rejection of amended Claim 50.

Independent Claim 51

Claim 51 was rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Publication 2002/0038901 to Kuroi et al. (hereinafter “Chau”). Claim 50 was rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Publication 2003/0107103 to Iwata as well. The rejections are respectfully traversed as Claim 51 has been amended to include “a substrate including a first well of a first-type dopant and a second well of a second type dopant; a source formed in the first well and drain formed in the second well” and “a first deep trench structure formed partially in the first well and partially in the second well”. Neither Kuroi nor Iwata teaches “a source formed in the first well and drain formed in the second well” and “a first deep trench structure formed partially in the first well and partially in the second well”. As such, the Kuroi and Iwata references do not teach every element of amended Claim 51, and therefore, cannot support an anticipation rejection of amended Claim 51.

Dependent Claims

Claims 2-3 and 5-17 depend from Claim 4, and are also believed to be distinct from the art of record, for example for the same reasons discussed above with respect to Claim 4.

Claims 19-20 and 22-34 depend from Claim 21, and are also believed to be distinct from the art of record, for example for the same reasons discussed above with respect to Claim 21.

Claims 36 and 38-49 depend from Claim 37, and are also believed to be distinct from the art of record, for example for the same reasons discussed above with respect to Claim 37.

Claims 52-54 have been added according to the specification.

Conclusion

Based on the foregoing, it is respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested.

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The Commissioner is hereby authorized to charge any additional fee required by this paper, or to credit any overpayment, to Deposit Account No. 08-1394 of Haynes and Boone LLP.

Respectfully submitted,


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